THAT WHICH IS CLAIMED IS:

1. A method of producing a population of labeled target cDNA, comprising combining a cDNA template with a mixture comprising 48μM dATP, 48μM dCTP, 48μM dGTP, 6μM dTTP and 6 μM of fluorescently labeled nucleotide selected from the group consisting of dUTP-Cy3™ and dUTP-Cy5™ to provide a nucleotide labeling mixture;

adding a nucleic acid primer sufficient to prime the enzymatic generation of a population of target nucleic acids complementary to the cDNA template; and then

reacting the primer and the nucleotide labeling mixture in the presence of the Klenow fragment of DNA polymerase I to produce labeled target cDNA.

2. The method according to Claim 1, wherein the primer is the HEXANUCLEOTIDE™ primer.

3. The method according to Claim 1, wherein the cDNA template is a first strand complement of an mRNA population.

4. The method according to Claim 1, wherein the primer and the nucleotide labeling mixture in the presence of the Klenow fragment of DNA polymerase I are reacted at 37°C.

5. A method of hybridizing a population of target nucleic acids to an array made up of a plurality of probe nucleic acid samples stably associated with the surface of a solid support, said method comprising:

generating said population of target nucleic acids by:

combining a cDNA template with a mixture comprising 48mM dATP, 48mM dCTP, 48mM dGTP, 6mM dTTP and 6 mM of fluorescently

labeled nucleotide selected from the group consisting of dUTP-Cy3™ and dUTP-Cy5™ to provide a nucleotide labeling mixture;

adding a nucleic acid primer sufficient to prime the enzymatic generation of a population of target nucleic acids complementary to the cDNA template; and then

reacting the primer and the nucleotide labeling mixture in the presence of the Klenow fragment of DNA polymerase I to produce labeled target cDNA; and then

hybridizing said generated population of target nucleic acids to plurality of probe nucleic acid samples stably associated with the surface of a solid support.

6. The method according to, wherein the probe nucleic acid samples comprise cDNA.

7. The method of Claim 1, wherein the probe nucleic acid samples comprise oligonucleotides.

8. The method of Claim 5, wherein the solid support is a glass slide.

9. The method of Claim 8, wherein the glass slide is coated with an aminosilane compound.

10. The method of Claim 5, wherein the hybridization step is carried out in a hybridization buffer comprising polyA RNA, Calf Thymus DNA, 5X SSC, 5X Denhard's solution, 50% formamide, and 0.5% SDS, wherein the SDS has a pH of between about 7.18 and about 7.25.

11. The method according to Claim 10, wherein the SDS has a pH of 7.2.

12. The method according to Claim 5, further comprising the step of treating the plurality of probe nucleic acid samples stably associated with the surface of a solid support with a prehybridizing buffer prior to hybridization, the prehybridizing buffer comprising 5X SSC, 1 % BSA Fraction V and 0.1% SDS, and wherein the SDS has a pH of between about 7.18 and about 7.25.

13. The method according to Claim 10, wherein the SDS has a pH of 7.2.

14. The method according to Claim 5, wherein the hybridization step is carried out at 42°C.

15. The method according to Claim 5, wherein the hybridization step is followed by at least three post-hybridization washes with post-hybridization buffers, wherein the first post-hybridization buffer comprises 1X SSC and 0.2% SDS, the second post-hybridization buffer comprises 0.1X SSC and 0.2% SDS, and the third post-hybridization buffer comprises 0.1 % SSC, and wherein the SDS has a pH of between about 7.18 and about 7.25.

16. The method according to Claim 15, wherein the SDS has a pH of 7.2.

17. A kit for fluorescently labeling a nucleic acid, comprising:

a labeling mixture comprising dATP, dCTP, dGTP, dTTP and at least one of a fluorescently labeled nucleotide selected from the group consisting of dUTP-Cy3™ and dUTP-Cy5™ , wherein the ratio of dATP to dCTP to dGTP to dTTP to dUTP-Cy3 or dUTP-Cy5 is 8:8:8:1:1.

18. The kit according to Claim 17, wherein the labeling mix is a 5X mixture, and ratio of concentrations of dATP to dCTP to dGTP to dTTP to dUTP-Cy3 or dUTP-Cy5 is 240 μM: 240 μM: 240 μM:30 μM:30 μM.

19. The kit according to Claim 17, further comprising the HEXANUCLEOTIDE™ primer.

20. The kit according to Claim 17, further comprising the Klenow fragment of DNA polymerase I in an amount sufficient to incorporate nucleotides into a cDNA strand in a reverse transcriptase reaction.